



## DEPARTMENT OF TRANSPORTATION

### Federal Aviation Administration

#### 14 CFR Part 25

#### [Docket No. FAA-2020-0721; Special Conditions No. 25-785-SC]

**Special Conditions:** Mitsubishi Aircraft Corporation Model MRJ-200 Airplane; Use of Automatic Power Reserve for Go-Around Performance Credit.

**AGENCY:** Federal Aviation Administration (FAA), DOT.

**ACTION:** Final special conditions; request for comments.

**SUMMARY:** These special conditions are issued for the Mitsubishi Aircraft Corporation (MITAC) Model MRJ-200 airplane. This airplane will have a novel or unusual design feature when compared to the state of technology envisioned in the airworthiness standards for transport-category airplanes. This design feature is an Automatic Takeoff Thrust Control System (ATTCS), referred to as an Automatic Power Reserve (APR), to set the performance level for approach-climb operation after an engine failure. The applicable airworthiness regulations do not contain adequate or appropriate safety standards for this design feature. These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

**DATES:** This action is effective on MITAC on [INSERT DATE OF PUBLICATION IN THE FEDERAL REGISTER]. Send comments on or before [INSERT DATE 45 DAYS AFTER PUBLICATION IN THE FEDERAL REGISTER].

**ADDRESSES:** Send comments identified by Docket No. FAA-2020-0721 using any of the following methods:

- *Federal eRegulations Portal:* Go to <http://www.regulations.gov/> and follow the online instructions for sending your comments electronically.

- *Mail:* Send comments to Docket Operations, M-30, U.S. Department of Transportation (DOT), 1200 New Jersey Avenue, SE., Room W12-140, West Building Ground Floor, Washington, DC, 20590-0001.
- *Hand Delivery or Courier:* Take comments to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.
- *Fax:* Fax comments to Docket Operations at 202-493-2251.
- *Privacy:* Except for Confidential Business Information (CBI) as described in the following paragraph, and other information as described in 14 CFR 11.35, the FAA will post all comments received without change, to <http://www.regulations.gov/>, including any personal information you provide. The FAA will also post a report summarizing each substantive verbal contact received about this proposal.
- *Confidential Business Information:* Confidential Business Information (CBI) is commercial or financial information that is both customarily and actually treated as private by its owner. Under the Freedom of Information Act (FOIA) (5 U.S.C. 552), CBI is exempt from public disclosure. If your comments responsive to this Notice contain commercial or financial information that is customarily treated as private, that you actually treat as private, and that is relevant or responsive to this Notice, it is important that you clearly designate the submitted comments as CBI. Please mark each page of your submission containing CBI as “PROPIN.” The FAA will treat such marked submissions as confidential under the FOIA, and the indicated comments will not be placed in the public docket of this Notice. Send submissions containing CBI to the person indicated in the Contact section below. Comments the FAA receives, which are not specifically designated as CBI, will be placed in the public docket for this rulemaking.

- *Docket*: Background documents or comments received may be read at

<http://www.regulations.gov/> at any time. Follow the online instructions for accessing the docket or go to Docket Operations in Room W12-140 of the West Building Ground Floor at 1200 New Jersey Avenue, SE., Washington, DC, between 9 a.m. and 5 p.m., Monday through Friday, except Federal holidays.

**FOR FURTHER INFORMATION CONTACT:** Joe Jacobsen, Performance and Environment Section, AIR-625, Technical Innovation Policy Branch, Policy and Innovation Division, Aircraft Certification Service, Federal Aviation Administration, 2200 South 216th Street, Des Moines, Washington 98198; telephone and fax 206-231-3158; e-mail [joe.jacobsen@faa.gov](mailto:joe.jacobsen@faa.gov).

**SUPPLEMENTARY INFORMATION:**

The substance of these special conditions has been published in the *Federal Register* for public comment in several prior instances with no substantive comments received.

Therefore, the FAA has determined that prior public notice and comment are unnecessary, and finds that, for the same reason, good cause exists for adopting these special conditions upon publication in the *Federal Register*.

**Comments Invited**

The FAA invites interested people to take part in this rulemaking by sending written comments, data, or views. The most helpful comments reference a specific portion of the special conditions, explain the reason for any recommended change, and include supporting data.

The FAA will consider all comments received by the closing date for comments. The FAA may change these special conditions based on the comments received.

## **Background**

On March 3, 2015, MITAC applied for a type certificate for their new Model MRJ-200 airplane. This airplane is a twin-engine, transport-category airplane with seating for 92 passengers and a maximum takeoff weight of 98,767 pounds.

## **Type Certification Basis**

Under the provisions of title 14, Code of Federal Regulations (14 CFR) 21.17, the applicant must show that the airplane meets the applicable provisions of 14 CFR part 25, as amended by amendments 25-1 through 25-141.

If the Administrator finds that the applicable airworthiness regulations (e.g., 14 CFR part 25) do not contain adequate or appropriate safety standards for the MITAC Model MRJ-200 airplane because of a novel or unusual design feature, special conditions are prescribed under the provisions of § 21.16.

Special conditions are initially applicable to the model for which they are issued. Should the type certificate for that model be amended later to include any other model that incorporates the same novel or unusual design feature, these special conditions would also apply to the other model under § 21.101.

In addition to the applicable airworthiness regulations and special conditions, the MITAC Model MRJ-200 airplane must comply with the fuel-vent and exhaust-emission requirements of 14 CFR part 34, and the noise-certification requirements of 14 CFR part 36.

The FAA issues special conditions, as defined in 14 CFR 11.19, in accordance with § 11.38, and they become part of the type certification basis under § 21.17(a)(2).

## **Novel or Unusual Design Features**

The MITAC Model MRJ-200 airplane will incorporate the following novel or unusual design feature:

An Automatic Takeoff Thrust Control System, referred to as an Automatic Power Reserve, to set the performance level for approach-climb operation after an engine failure.

## **Discussion**

MITAC included an APR system (an ATTCS) in the Model MRJ-200 airplane and proposed using the APR function during go-around. They also requested approach-climb performance credit for the use of additional thrust set by the APR system. The MITAC Model MRJ-200 powerplant control system comprises a Full Authority Digital Engine Control (FADEC) for the engine. The engine FADEC system utilizes the APR function during the takeoff and go-around phases of the flight when additional thrust is needed from an operating engine following a single engine failure. The APR system is available at all times, without any additional action from the pilot. It allows the pilot to use the same power-setting procedure during a go-around regardless of whether or not an engine fails. Because the APR system is always armed, it will function automatically following an engine failure, and advance the remaining engine to a higher thrust level.

The part 25 standards for ATTCS, contained in § 25.904, and appendix I to part 25, specifically restrict performance credit for ATTCS to takeoff. Expanding the standards to include other phases of flight, including go-around, was considered at the time the standards were issued, but flightcrew workload issues precluded further consideration. As the preamble of amendment 25-62 states:

In regard to ATTCS credit for approach-climb and go-around maneuvers, current regulations preclude a higher power for the approach climb (§ 25.121(d)) than for the landing climb (§ 25.119). The workload required for the flightcrew to monitor and select from multiple in-flight power settings in the event of an engine failure during a critical point in the approach, landing, or go-around operations is excessive. Therefore, the amendment should not include the use of ATTCS for anything except the takeoff phase.

Because the airworthiness regulations do not contain appropriate safety standards to allow approach-climb performance credit for ATTCS, special conditions are required to ensure a level of safety equivalent to that established in the regulations. The definition of a critical

time interval for the approach-climb case, during which time it must be extremely improbable to violate a flight path based on the § 25.121(d) gradient requirement, is of primary importance. In the event of a simultaneous failure of both an engine and the APR function, falling below the minimum flight path defined by the 2.5-degree approach, decision height, and climb gradient required by § 25.121(d) must be shown to be an extremely improbable event during this critical time interval. The § 25.121(d) gradient requirement implies a minimum one-engine-inoperative flight path capability with the airplane in the approach configuration. The engine may have been inoperative before initiating the go-around, or it may become inoperative during the go-around. The definition of the critical time interval must consider both possibilities.

These special conditions contain the additional safety standards that the Administrator considers necessary to establish a level of safety equivalent to that established by the existing airworthiness standards.

### **Applicability**

As discussed above, these special conditions are applicable to the MITAC Model MRJ-200 airplane. Should MITAC apply at a later date for a change to the type certificate to include another model incorporating the same novel or unusual design feature, these special conditions would apply to that model as well.

### **Conclusion**

This action affects only a certain novel or unusual design feature on one model of airplanes. It is not a rule of general applicability.

### **List of Subjects in 14 CFR Part 25**

Aircraft, Aviation safety, Reporting and recordkeeping requirements.

### **Authority Citation**

The authority citation for these special conditions is as follows:

**Authority:** 49 U.S.C. 106(f), 106(g), 40113, 44701, 44702, 44704.

## **The Special Conditions**

Accordingly, pursuant to the authority delegated to me by the Administrator, the following special conditions are issued as part of the type certification basis for MITAC Model MRJ-200 airplanes.

1. The MITAC Model MRJ-200 airplane must comply with the requirements of 14 CFR 25.904, and appendix I, and the following requirements for the go-around phase of flight:
2. Definitions
  - a. Takeoff/go-around (TOGA): Throttle lever in takeoff or go-around position.
  - b. Automatic Takeoff Thrust Control System: The ATTCS in MITAC Model MRJ-200 airplanes is defined as the entire automatic system available during takeoff and in go-around mode, including all devices, both mechanical and electrical, that sense engine failure, transmit signals, actuate fuel controls or power levers (or increase engine power by other means on operating engines to achieve scheduled thrust or power increase), and furnish cockpit information on system operation.
  - c. Critical time interval:
    - (1) When conducting an approach for landing using ATTCS, the critical time interval is defined as follows:
      - (i) The critical time interval begins at a point on a 2.5-degree approach glide path from which, assuming a simultaneous engine and ATTCS failure, the resulting approach-climb flight path intersects a flight path originating at a later point on the same approach path that corresponds to the part 25 one-engine-inoperative approach-climb gradient. The period of time from the point of simultaneous engine and ATTCS failure, to the intersection of these flight paths, must be no shorter than the time interval used in evaluating the critical time interval for takeoff, beginning from the point of simultaneous engine and ATTCS failure and ending upon reaching a height of 400 feet.

- (ii) The critical time interval ends at the point on a minimum performance, all-engines-operating go-around flight path from which, assuming a simultaneous engine and ATTCS failure, the resulting minimum approach-climb flight path intersects a flight path corresponding to the part 25 minimum one-engine-inoperative approach-climb gradient. The all-engines-operating go-around flight path, and the part 25 one-engine-inoperative approach-climb gradient flight path, originate from a common point on a 2.5-degree approach path. The period of time from the point of simultaneous engine and ATTCS failure, to the intersection of these flight paths, must be no shorter than the time interval used in evaluating the critical time interval for the takeoff, beginning from the point of simultaneous engine and ATTCS failure and ending upon reaching a height of 400 feet.
- (2) The critical time interval must be determined at the altitude resulting in the longest critical time interval for which one-engine-inoperative approach-climb performance data are presented in the airplane flight manual.
- (3) The critical time interval is illustrated in Figure 1:

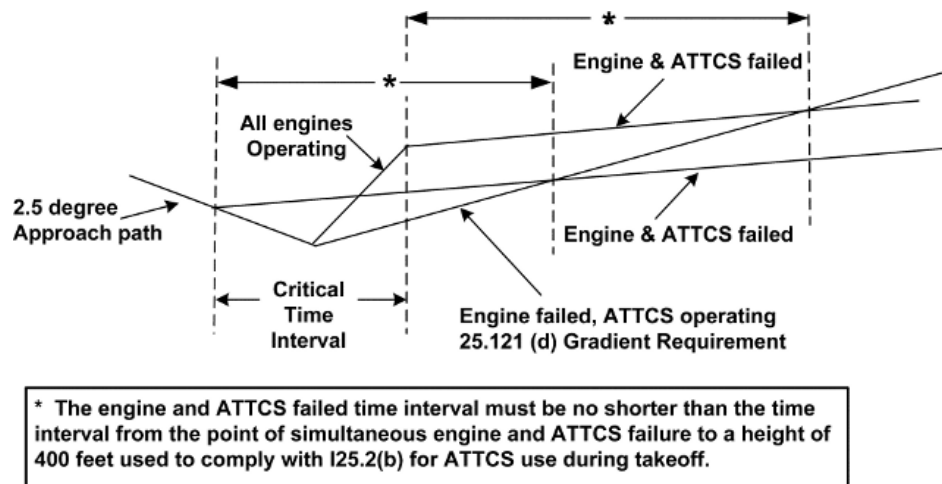


Figure 1: Go-around ATTCS



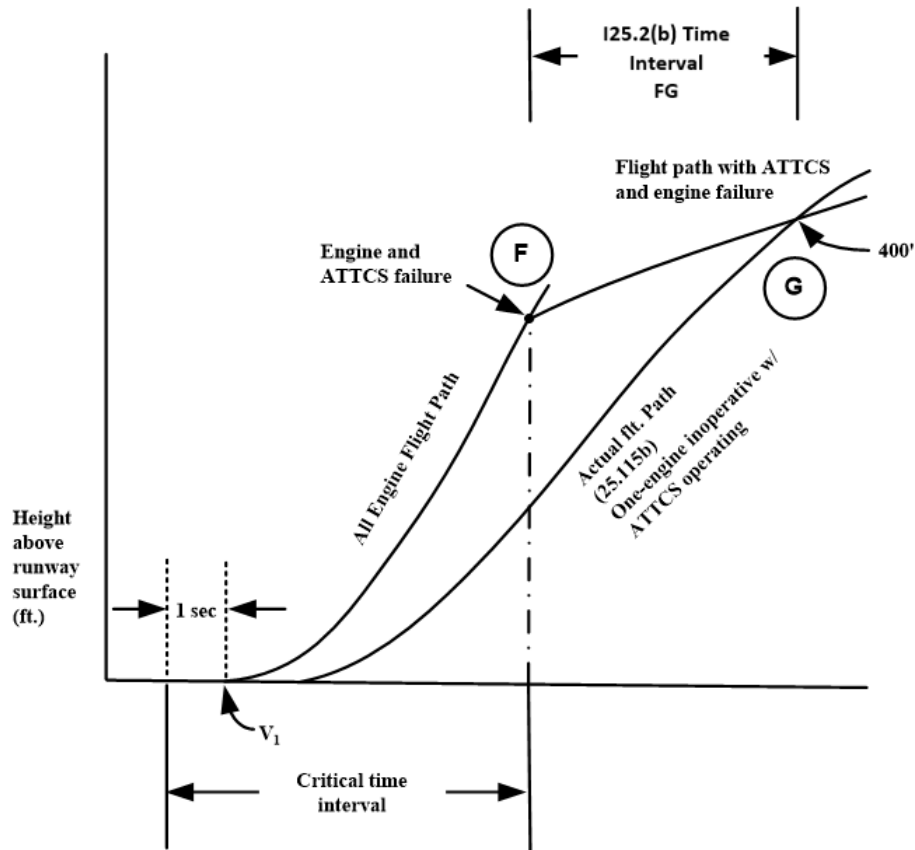


Figure 2: Appendix I25.2(b), “Critical Time Interval” (ATTCS takeoff)

The all-engines-operating go-around flight path, and the part 25 one-engine-inoperative approach-climb gradient flight path (engine failed, ATTCS operating path in Figure 1), originate from a common point, point C, on a 2.5-degree approach path. The period of time, “time interval DE,” from the point of simultaneous engine and ATTCS failure, point D, to the intersection of these flight paths, point E, must be no shorter than the corresponding time in Figure 2, above.

- d. The “critical time interval AD” is illustrated in Figure 1.
3. Performance and system reliability requirements: The applicant must comply with the performance and ATTCS reliability requirements as follows:
  - a. An ATTCS failure or a combination of failures in the ATTCS during the critical time interval (Figure 1):

- (1) Must not prevent the insertion of the maximum approved go-around thrust or power, or must be shown to be a remote event.
    - (2) Must not result in a significant loss or reduction in thrust or power, or must be shown to be an extremely improbable event.
  - b. The concurrent existence of an ATTCS failure and an engine failure during the critical time interval must be shown to be extremely improbable.
  - c. All applicable performance requirements of part 25 must be met with an engine failure occurring at the most critical point during go-around with the ATTCS functioning.
  - d. The probability analysis must include consideration of ATTCS failure occurring after the time at which the flightcrew last verifies that the ATTCS is in a condition to operate until the beginning of the critical time interval.
  - e. The propulsive thrust obtained from the operating engine, after failure of the critical engine during a go-around used to show compliance with the one-engine-inoperative climb requirements of § 25.121(d), may not be greater than the lesser of:
    - (1) The actual propulsive thrust resulting from the initial setting of power or thrust controls with the ATTCS functioning, or
    - (2) 111 percent of the propulsive thrust resulting from the initial setting of power or thrust controls with the ATTCS failing to reset thrust or power, and without any action by the flightcrew to reset thrust or power.
4. Thrust setting
- a. The initial go-around thrust setting on each engine at the beginning of the go-around phase may not be less than any of the following:
    - (1) That required to permit normal operation of all safety-related systems and equipment dependent upon engine thrust or power lever position; or
    - (2) That are shown to be free of hazardous engine-response characteristics, and not to result in any unsafe airplane operating or handling characteristics when thrust or

power is advanced from the initial go-around position to the maximum approved power setting.

- b. For approval to use an ATTCs for go-arounds, the thrust-setting procedure must be the same for go-arounds initiated with all engines operating as for go-around initiated with one engine inoperative.

## 5. Powerplant controls

- a. In addition to the requirements of § 25.1141, no single failure or malfunction, or probable combination thereof, of the ATTCs, including associated systems, may cause the failure of any powerplant function necessary for safety.
- b. The ATTCs must be designed to:
  - (1) Apply thrust or power to the operating engine(s), following any one-engine failure during a go-around, to achieve the maximum approved go-around thrust without exceeding the engine operating limits;
  - (2) Permit manual decrease or increase in thrust or power up to the maximum go-around thrust approved for the airplane, under the existing conditions, through the use of the power lever. For airplanes equipped with limiters that automatically prevent the engine operating limits from being exceeded under existing ambient conditions, other means may be used to increase the thrust in the event of an ATTCs failure, provided that the means:
    - (i) Is located on or forward of the power levers;
    - (ii) Is easily identified and operated under all operating conditions by a single action of either pilot with the hand that is normally used to actuate the power levers; and
    - (iii) Meets the requirements of § 25.777(a), (b), and (c).
  - (3) Provide a means to verify to the flightcrew, before beginning an approach for landing, that the ATTCs is in a condition to operate (unless it can be demonstrated

that an ATTCS failure, combined with an engine failure during an entire flight, is extremely improbable).

6. Powerplant instruments: In addition to the requirements of § 25.1305:

- a. A means must be provided to indicate when the ATTCS is in the armed or ready condition; and
- b. If the inherent flight characteristics of the airplane do not provide adequate warning that an engine has failed, a warning system that is independent of the ATTCS must be provided to give the pilot a clear warning of any engine failure during a go-around.

Issued in Kansas City, Missouri, on March 17, 2021.

Patrick R. Mullen,  
Manager, Technical Innovation Policy Branch,  
Policy and Innovation Division,  
Aircraft Certification Service.

[FR Doc. 2021-06027 Filed: 3/24/2021 8:45 am; Publication Date: 3/25/2021]